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Price Action Around Rights Offerings

Evidence from Nasdaq Helsinki

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TIIVISTELMÄ:
Tämä tutkielma käsittelee Suomen osakemarkkinoilla vuosina 2005–2019 järjestettyjä merkintäoikeusanteja, keskittyen erityisesti merkintäoikeuksien irtoamispäivän sekä sitä ympäröivien päivien epänormaaleihin osaketuottoihin. Tutkimusta suoritetaan sekä yksittäisten päivien, että kumulatiivisten tuottojen osalta. Toissijainen tutkimuskohde ovat merkintäoikeuksien hinnoitteluvirheet sinä lyhyenä aikana, kun ne ovat vapaasti luovutettavissa ja kaupankäynnin kohteena pörssissä. Merkintäoikeusannit ovat yhtiöille yksi monista keinoista kerätä oman pääoman ehtoista rahoitusta. Luonteeltaan ne ovat kuitenkin huomattavan erilaisia, sillä merkintäoikeusanneissa vanhoilla osakkeenomistajilla on muista keinoista poiketen halutessaan mahdollisuus säilyttää suhteellinen omistusosuutensa yhtiöstä.

COVID-19-pandemia on vaikuttanut hyvin negatiivisesti useisiin yhtiöihin ja jopa kokonaisiin toimialoihin, sillä ihmisten muuttuneet kulutustottumukset ja yhteiskunnissa nähdyt kovat rajoitustoimenpiteet ovat muokanneet niiden toimintaympäristöä ja –mahdollisuuksia merkittävästi. Käynnissä olevan kriisin seurauksena on järjestetty myös merkintäoikeusanteja, joista yhtenä esimerkkinä suomalainen lentoyhtiö Finnair. Finnairin merkintäoikeusannissa nähtiinkin varsin epänormaali positiivinen tuotto merkintäoikeuksien irrotessa osakkeesta ja myöhemmin suuria hinnoitteluvirheitä myös merkintäoikeuksissa, kun niillä käytiin kauppaa selvästi alle teoreettisen arvon. Tästä havainnosta ja aikaisemman suomalaisiin merkintäoikeusanteihin liittyvän tutkimuksen puutteista motivoituneena syntyi päätös tutkia, onko vastaavanlainen markkinoiden epänormaali toiminta yleistä merkintäoikeusantien yhteydessä.

Yhteensä 50 havaintoa edellä mainitulta aikaväliltä sisältävän otoksen perusteella voidaan todeta, että keskimäärin merkintäoikeuksien irtoamispäivänä osakkeesta on saanut hieman yli kolmen prosentin positiivisen epänormaalin tuoton. Tämän lisäksi tulokset osoittavat, että merkintäoikeuksien irtoamispäivän jälkeen osakkeesta on saanut kumulatiivisesti yli yhdeksän prosentin negatiivisen epänormaalin tuoton ensimmäisen kymmenen kaupankäyntipäivän aikana. Vertailua tehdään myös suurten ja pienten yhtiöiden välillä. Vertailun tuloksena selviää, että osakkeiden epänormaalit tuotot ovat keskimäärin suurempia pienemmän markkina-arvon yhtiöissä, mutta niitä esiintyy myös suurissa yhtiöissä. Tutkielman toisena mielenkiinnon kohteena olevien merkintäoikeuksien hinnoitteluvirheiden osalta voidaan todeta, että keskimäärin ja suurimassa osassa tapauksista merkintäoikeuksilla käydään pörssissä kauppaa alle teoreettisten arvojen.

Näistä tuloksista voi olla hyötyä sijoittajien päätöksenteossa merkintäoikeusantien luomissa erikoistilanteissa. On kuitenkin hyvä huomata, että etenkin markkina-arvoltaan pienten ja likviditeetiltään vähäisten yhtiöiden kohdalla hinnoitteluvirheistä ja markkinoiden epänormaalista toiminnasta hyötyminen ei ole aivan yksinkertaista, sillä Suomessa esimerkiksi monien osakkeiden lyhyeksi myyminen ei ole mahdollista. Tämä asettaa tiettyjä rajoituksia sille, missä määrin ja millä keinoin sijoittajan on mahdollista näistä syntyneistä erikoistilanteista hyötyä.

KEYWORDS: Rights offering, equity financing, market efficiency, event study, mispricing

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Abbreviations and definitions

AAR = Average abnormal return

AMEX = American Stock Exchange

CAAR = Cumulative average abnormal return

ERD = Ex-rights date

IPO = Initial Public Offering

MEUR = Million Euros

NYSE = New York Stock Exchange

SEO = Seasoned equity offering

TERP = Theoretical ex-rights price

1 Introduction

Rights offerings are a method for companies to raise equity capital from investors. They have been and still are quite common in Asia, Europe and Australia, whereas in the United States they are virtually non-existent (Gao & Ritter, 2010). In contrast to other methods of raising equity such as private placements and public equity issuances, rights offerings are more linked to the stock market. The subscription rights are distributed to the company shareholders on a pro rata basis, and in Finland among many countries they are freely transferable in the stock exchange for a fairly short period of time, usually about one week.

1.1 Background and motivation

The Finnish airline company Finnair carried out a rights offering during the summer of 2020. In Finnair's case, the company with a market capitalization of hundreds of millions of euros traded at a premium of approximately 20–40% for almost the entire offering period, compared with the price implied by the combination of buying the subscription rights from the market and exercising them. Essentially, it should not matter whether one purchases the stock directly or through buying the rights and exercising them, as he ends up with the same outcome. Another interesting feature in the rights offering of Finnair was that on the ex-rights date (ERD from now on), the company stock price appreciated by over 50% with no news whatsoever. Similar stock price behaviour occurred later in the autumn, in the rights offering of Scandinavian Airlines, that is listed in the stock exchanges of Oslo, Copenhagen and Stockholm.

Given that the market and trading environment has changed quite dramatically since Berglund & Wahlroos (1985) conducted a study on rights mispricing in the Finnish stock market, a study that better reflects the current characteristics (improved liquidity, low transaction costs, possibility to sell short some stocks) of the Finnish market is needed. In addition, the study by Wahlroos & Berglund (1985) does not include extreme market

events, whereas this study has two of them, the global financial crisis and the European debt crisis. Using improved methodologies, more novel evidence and a more diverse set of different market environments, this thesis intends to fill the gap of missing evidence of abnormal stock returns around the ERD and outdated evidence of rights mispricing in the Finnish stock market.

Rights offerings have not been that frequent in Finland for the previous couple of years, but during 2020 several companies either announced and carried out them or informed investors that they have an intention to do so. This recent increase in activity is at least partially attributable to the COVID-19 pandemic, that has hit some industries like the airlines quite hard. This has led to companies strengthening their balance sheets with equity issuances. A similar thing happened in 2009 after the global financial crisis, as the highest number of companies for a long time (and ever since) conducted a rights offering in Nasdaq Helsinki. My expectation is that in case the pandemic becomes prolonged and restrictions in societies remain, more and more companies will need to use rights offerings or other methods of raising equity capital in order to strengthen their financial position. This makes the subject of this thesis more topical.

1.2 Purpose and limitations of the study

The purpose of this study is to investigate several aspects of the rights offerings of publicly traded Finnish companies from 2005 through 2019. The Finnish stock market is quite small measured by both, the total market capitalization and the number of publicly traded companies. This provides an interesting setting to look into these special company events in a Nordic equity market where the trading volumes and market capitalizations are relatively small, thus creating increased potential for mispricing and inefficiencies. The Nordics have received increasing interest by researchers investigating different investment strategies in this type of a market setting (Grobys & Huhta-Halkola 2019; Jokipii & Vähämaa 2006; Leivo & Pätäri 2009; Leivo 2012; Nikkinen, Sahlström, Takko & Äijö 2009; Rinne & Vähämaa 2011; Silvasti, Grobys & Äijö 2020).

Despite being still somewhat small, the Finnish stock market has developed rapidly during the last couple of decades. Foreign ownership has risen, the environment in terms of external factors such as politics and corruption is quite a low-risk one and Finland's credit rating is the same as that of the United States, double-A. Compared with the more risky emerging markets, these circumstances improve the overall transparency of the Finnish stock market. (Grobys & Huhta-Halkola, 2019.)

Research questions include examining whether the stock prices efficiently adjust to the detachment of subscription rights. In addition, another focus area is to examine the stock price behaviour as well as development of the spread between the stock price and its implied theoretical value during the offering period. As the period during which the subscription rights are freely transferable is fairly short, there could exist price pressure as the shareholders unwilling or unable to exercise their rights need to sell them in the stock exchange, since otherwise they will expire worthless. The possible price pressure of subscription rights could lead to either price pressure in the stock price as well or increase in the deviation between the actual and implied price of the stock. But the main focus here is to examine the abnormal stock returns around the event of rights becoming detached from the stock, while the degree of subscription rights' mispricing is a secondary subject of interest.

The results could provide investors with valuable information about rights offerings. For example, existing shareholders and special situation investors could attempt to benefit from these individual company related events, if there is an opportunity to do so by executing a certain strategy. However, there are some limitations in the study that are worth noting, when considering the real-life applicability of the findings. Most importantly, it does not take into account the possible transaction costs or tax ramifications, that could result from purchasing and selling stocks or subscription rights. These are factors that could arguably affect the behaviour of market participants and cause them to look like they are behaving irrationally from the standpoint of one assuming that these factors do not exist.

1.3 Intended contribution to existing literature and hypotheses

Most event studies on the price action around rights offerings measure the abnormal returns of the announcement date and the period surrounding it, as new information about the company becomes public. This strand of literature consists of evidence from European (e.g., Tsangarakis 1996; Bøhren, Eckbo & Michalsen 1997), Asian (Ariff, Khan & Baker 2007; Kang & Stulz 1996), Australian (Owen & Suchard 2008) and the United States (e.g., Bae & Jo 1999; Hansen 1988; White & Lusztig 1980) equity markets. The literature measuring how well does the stock price adjust to the detachment of the subscription rights on the ERD (Bolognesi & Gallo 2013; Eckbo & Masulis 1992; Gajewski & Ginglinger 2002; Kang & Stulz 1996) is significantly narrower.

The previous Finnish research on rights offerings (Berglund & Wahlroos 1985; Rantapuska & Knüpfer 2008) does not address the issue of abnormal returns around the ERD, which leaves a gap in the literature. Given how the frictions, such as low trading volumes, high transaction costs and prohibition of any short selling have diminished in the Finnish stock market after Berglund & Wahlroos' (1985) study on rights mispricing, novel evidence that better reflects the current market and trading environment is needed. In addition, the sample used in this study is larger than that of Berglund & Wahlroos (1985) and includes evidence also during extreme market events: the global financial crisis of 2007–2008 and the subsequent European debt crisis in the early 2010s. Furthermore, this study is the first one to apply the generalized rank testing procedure by Kolari & Pynnönen (2011) on the ERD abnormal returns, that is shown to be better in determining the true robustness of the empirical findings. Finally, this study adds to the vast literature testing the efficient market hypothesis by Fama (1970), providing evidence on the efficiency of price action around rights offerings in the small, thinly traded Finnish equity market.

Based on the finance theory and the assumption of efficient markets, an event like the detachment of subscription rights should not result in abnormal stock returns (AR). The event does not contain any new information about the company, as it is known in

advance, and thus the stock price adjustment in this case is a technical one. However, some previous evidence (Bolognesi & Gallo 2013; Eckbo & Masulis 1992; Gajewski & Ginglinger 2002) contradicts the idea of no abnormal returns. The null hypothesis, that there is no average abnormal return (AAR) on the ERD is tested to determine whether it can be rejected. The alternative hypothesis is as follows:

H1: On the ex-rights date, AAR ≠ 0

As an extension of the first hypothesis, another topic of interest is the (cumulative) average abnormal stock returns (CAAR) after the ERD. Although again there is some previous evidence of abnormal returns (Bolognesi & Gallo 2013; Gajewski & Ginglinger 2002), the assumption of no abnormal returns is supported by the idea of market efficiency. As with the first one, this hypothesis is tested, and the alternative one can be stated as:

H2: After the ex-rights date, CAAR ≠ 0

Finally, the literature also lacks recent evidence on the pricing efficiency of Finnish subscription rights, even though Berglund & Wahlroos (1985) have addressed it before. Although somewhat mixed, the previous literature from other equity markets is tilted towards the conclusion that the rights often trade below their intrinsic value (Bae & Levy 1994; Poitras 2002; Sukor & Bacha 2010). However, the law of one price would suggest that similar securities should trade at parity. Contradicting the idea of law of one price, the last hypothesis is:

H3: Rights trade at a discount relative to their theoretical or implied values

1.4 Structure of the study

The rest of the study is organized as follows. After this introduction part, there is a section that discusses the theoretical framework around the topic, pursuing to address both

the corporate finance and financial markets side of things. Next, there is a literature review chapter, where I will go through some previous studies conducted, their results and implications. After the literature review, there are chapters introducing the data and methodology used in the study, after which comes the results part. Lastly, there is a conclusion section that summarizes the study and its findings, providing my own interpretation, discussion and ideas for further research of the issues addressed.

2 Theoretical framework

In this section I will go through the theoretical framework around rights offerings in order to provide a more comprehensive view of the environment, in which we operate. First, there are chapters that discuss the theory of corporate capital structure and compare the different methods of public companies to raise equity capital after their initial public offering (IPO). The latter ones will also shed more light on the actual procedure of rights offerings, as well as other ways of equity raises. After that, I will briefly go through information concerning the stock market in general. This means discussing assumptions of the efficient market hypothesis, the relationship between risk and return and how it can be measured.

2.1 The capital structure puzzle

If a company needs additional capital, it can either raise it as equity, borrow it as debt or use a mixture of both. The choices of capital structure as well as the optimal capital structure have been debated for decades in the academic literature. As a result, multiple alternative theories on the subject have risen, of which I will now go through some of the most well-known ones.

2.1.1 The Modigliani-Miller theorem

The Modigliani-Miller theorem, or the irrelevance theory of capital structure by Modigliani & Miller (1958), is widely considered to be the founding work on corporate capital structure. The core idea of it is that the value of a company remains the same regardless of how it has been financed, so the balance between equity and leverage is indifferent in this sense. This view, however, relies on the assumption of perfect capital markets, where there are no frictions such as transaction costs, taxes or bankruptcy costs. In the

real world these frictions do exist, and that is why this approach is above all a theoretical one. (Modigliani & Miller, 1958.)

2.1.2 The trade-off theories

The original irrelevance theory motivated economists to come up with alternative theories that do not assume perfect capital markets. The trade-off theories of corporate capital structure include both static and dynamic theories. The main idea of these theories is to consider the costs and benefits of alternative leverage strategies.

The static trade-off theory originally stems from Miller's (1977) paper, where he adds the effect of corporate income tax into the strict irrelevance theory of Modigliani & Miller (1958). Increase in the use of leverage benefits the company through an earnings tax shield, because interest expenses are tax-deductible. Considering this, firms should prefer debt financing over equity. (Miller, 1977.)

However, there are also costs to increase in leverage. Myers (1984) points out the costs of financial distress that may result from excessive use of leverage. These include for example the legal and administrative costs of corporate bankruptcy, agency costs and monitoring costs. Balancing between the benefits of tax shield and the costs of financial distress suggests that risky firms should use less debt financing than safe firms. In addition, firms that hold mostly tangible assets will borrow less than those operating on specialized, intangible assets or growth opportunities. (Myers, 1984.)

One clear deficiency of the static trade-off theory is that it does not take into consideration the costs associated with recapitalization. Fischer, Heinkel & Zechner (1989) study the optimal capital structure choice while taking these costs into account. Their model examines the issue in a continuous-time framework. Firms will allow their capital structure to adjust over time within a range that can be considered optimal, instead of having one specific leverage ratio to aim at. This is due to the costs of recapitalization, that make

it less costly to temporarily operate with somewhat suboptimal capital structure (Fischer et al., 1989.)

2.1.3 The pecking order theory

The pecking order theory is not so much about the optimal capital structure of a company, but rather concentrates on examining the order in which companies prefer using different sources of financing. Myers (1984) concludes that firms prefer internal finance over external, meaning that they choose retained earnings or excess liquid assets over everything else. In case external finance is needed, firms will issue the safest securities first. This means choosing debt over hybrid securities like convertible bonds, which in turn are preferred over the issuance of equity instruments. (Myers, 1984.)

Myers & Majluf (1984) further discuss the possible explanations for this pecking order. They recognize that in addition to the administrative and underwriting costs of external financing, the asymmetric information between the company management and investors creates another type of cost. The management may possess more accurate information concerning the company and its investment opportunities, but the capital market participants might not agree with their calculations. This creates a possibility of the company choosing not to issue the securities, even when the financing is for positive-NPV investments. By using internal financing, this issue is eliminated. The preference of debt over issuance of equity is somewhat explained by the implication that firms only issue equity when they consider the company overvalued. Investors might refuse to buy the equity, unless it is clear that the firm has used its debt capacity. (Myers & Majluf, 1984.)

2.1.4 The market timing theory

Baker & Wurgler (2002) find that market timing has a significant effect on corporate capital structure. Particularly low-leverage firms raise equity capital during times of high

valuations, while firms with high degree of leverage tend to raise equity during times of low valuations. The valuations in the study are defined by comparing the market-to-book ratios of companies. The most likely explanation for these results is that the capital structure of a firm is largely affected by the cumulative outcome of past attempts of timing the equity market. (Baker & Wurgler, 2002.)

The market timing theory assumes that the management team believes they can time the market. Graham & Harvey (2001) report that managers thinking about issuing additional equity regard the possible over or undervaluation of their stock as one of the most important considerations in the process. This implies that the management teams do indeed attempt to time the market when raising equity funds.

2.2 Rights offerings

After initially going public, companies can later on issue additional shares to raise more equity capital. These equity issuances that occur after the IPO are called seasoned equity offerings (SEOs) or follow-on offerings. There is great variation across countries about whether it is mandatory by law or exchange rules to get shareholders' approval for equity issuances or can the management team act without shareholders' consent (Holderness, 2018). In Finland, majority vote by the shareholders is needed for the approval of a specific stock issue, and the issuance must occur within one year of the vote (Holderness, 2018).

One of the main methods for post-IPO equity raises are rights offerings, in which shareholders receive subscription rights that give them the right, but not an obligation to purchase newly issued shares in the company at a fixed price (Holderness & Pontiff, 2016). These subscription rights are short-term warrants as they typically expire in about 20 trading days in Finland, although there is some minor variation. The subscription rights are distributed on a pro rata basis, so that the existing shareholders have an option to

preserve their fractional ownership of the company by exercising the subscription rights distributed to them.

2.2.1 The rights offer paradox

It has been widely documented particularly in the United States, that companies prefer underwritten public SEOs over both non-underwritten and underwritten rights offerings, even though they are more costly for the company (Hansen & Pinkerton 1982; Heinkel & Schwartz 1986; Smith 1977). This is called the rights offer paradox. However, it is good to note that even though the direct costs of rights offerings are significantly lower, the indirect costs may push the total costs higher for some issuers (Ginglinger, Matsoukis & Riva, 2013). These indirect costs may include for example capital gains taxes for some investors, if they decide to sell their subscription rights on the market (Smith, 1977), adverse selection costs (Eckbo & Masulis, 1992) and lower liquidity in the shares after the offering, compared with a public issue (Kothare, 1997).

Apart from the costs, Ursel (2006) points out another possible explanation for the rights offer paradox, which is reputational risk. She finds that companies using rights offerings as their method of raising equity capital are often in financial distress, carrying a high level of debt. These companies usually do not have the access to high quality underwriters, unlike those firms that are in healthier financial condition. The reason for higher quality companies to shy away from rights offerings, despite the lower direct costs of them, is that they do not want to be associated with the companies under financial distress. (Ursel, 2006.)

Another concern for the management about rights offerings is the possibility that they fail because of the stock price falling below the fixed subscription price of new stocks issued (Bacon, 1972). No rational investor should purchase the stock through exercising his subscription rights, if he can get it cheaper just by paying the current exchange price.

However, this is mainly related to the pricing of the offering and will be further discussed in the forthcoming pricing and valuation of rights offerings chapter.

2.2.2 Shareholder's participation

In a rights offering, the company shareholder has multiple courses of action to choose from. He can exercise his subscription rights, sell them in the open market at the current exchange price or remain passive. It is also possible to exercise only a fraction of the rights and sell the remaining rights at exchange price. The outcomes are either preserving one's ownership in the company by exercising all rights, preserving some of it and receiving financial compensation for the dilution of ownership by exercising some and selling some of the rights, or taking the full dilutive effect of ownership in exchange for financial compensation by selling all of the rights. The important thing for the shareholder is to not be passive by either exercising or selling every subscription right received, because otherwise they will expire worthless, thus resulting in both a loss of capital and full dilutive effect on ownership of the company. However, it is good to note that transferability of the subscription rights is not mandatory in all countries, such as the United States, Australia and Israel, but in most countries including Finland, it is (Holderness & Pontiff, 2016).

If the rights offering does not get fully subscribed by the holders of subscription rights, the unsubscribed shares can be purchased in overallotment rounds by investors who do not hold the subscription rights needed for the shares (Holderness & Pontiff, 2016). These overallotment periods are why some of the studies concerning the participation rate in rights offerings may be somewhat misleading. For example, Hansen (1988) and Eckbo & Masulis (1992) report subscription rates of well over 90%, while Holderness & Pontiff (2016) argue that these types of figures cannot be representative of shareholder participation, but rather describe the total capital raised in relation to the capital that was initially sought. They also find that the share of passive shareholders in rights offerings is significantly higher than what is the common conception in academic literature,

as only 64% of the subscription rights are exercised in the primary offering rounds across the world. Rantapuska & Knüpfer (2008) study the participation in rights offerings in Finland and find that individual investors are the most likely to be completely passive in right offerings, thus leaving money on the table. They also state that financial institutions, particularly mutual funds, are the least likely to leave money on the table. These findings are supported by Kothare (1997) as well as Holderness & Pontiff (2016), who find that during rights offerings the proportional ownership of institutional investors, block holders and firm insiders increases. So, although being passive is the most irrational course of action, it is quite common especially among small retail investors.

2.2.3 Pricing and valuation

One of the major decisions in a rights offering is to come up with the subscription price for the stock issued. In order for the offering to be successful, the price needs to be set below the current market price (Bacon, 1972). As discussed earlier, one potential cause of worry in rights offerings for the management team is that the stock price falls below the subscription price of newly issued stock during the subscription period. If the existing shareholders and other investors are not incentivized to subscribe for the new shares, there is a risk of the offering failing to raise the capital initially sought. This threat can be eliminated by a recent financial innovation, where the company issuing equity does not set a fixed subscription price, but instead announces that the subscription price will be some specific discount to a future exchange price on a given day (Holderness & Pontiff, 2016). These types of rights offerings have not been carried out in Finland so far, as fixed subscription price is still the standard method used.

To ensure a full subscription in the rights offering, the issuer can make it prohibitively costly not to exercise the right by setting a deep rights offer discount, thus making the subscription rights more valuable (Bøhren et al., 1997). The exercise price can be set so much below the current stock price, that it becomes unlikely that the rights will be worthless at any point during the offering (Slovin, Sushka & Lai, 2000). The low exercise

price should not affect the existing shareholders' wealth directly, as the value of rights should move in tandem with the ex-rights stock price (Brealey, Myers & Allen, 2020). Another way of insuring that the capital raised equals the capital initially sought is to arrange an underwritten rights offering, in which an investment bank makes a standby commitment to take up any unsubscribed rights for a fee (Cronqvist & Nilsson, 2005). This naturally adds to the direct costs of the offering but removes the risk of failing to raise the capital.

To illustrate the relationship between the stock's ex-rights price and the theoretical value of the subscription right, we can look at how the pricing happens in theory. Theoretical ex-rights price (TERP) can be defined as the price that the "old" existing stock should in theory trade at once the subscription rights are distributed to the shareholders, given no change in equity value (Armitage, 2007). The theoretical ex rights price immediately before the distribution can be calculated using the formula:

$$TERP = \frac{P_{ex-1} \times N_{old} + P_{Offer} \times N_{new}}{N_{old} + N_{new}} \quad (1)$$

where: $P_{ex-1} =$ *Stock price at the close of day ex–1*

$P_{Offer} =$ *Subscription price of the newly issued stock*

$N_{Old} =$ *Shares outstanding prior to the offering*

$N_{New} =$ *Number of new shares issued in the offering*

Similarly, the theoretical value of a subscription right can also be calculated using some elements of the previous equation, with the following formula:

$$Theoretical\ value\ of\ a\ subscription\ right = \frac{P_{ex-1} - P_{Offer}}{N_{rights} + 1} \quad (2)$$

where: $P_{ex-1} =$ *Stock price at the close of day ex–1*

$P_{Offer} =$ *Subscription price of the newly issued stock*

$N_{rights} =$ *Number of rights needed to purchase one new share*

Since a subscription right as an instrument is very similar to a call option, the option pricing model of Black & Scholes (1973) can also be utilized to value it. However, first it has to be adjusted to reflect the dilution taking place due to the offering. Smith's (1977) model is often used in pricing of rights when the stock is still trading cum rights (rights still attached):

$$Value\ of\ a\ right = (1-\alpha) \times \left(S \times N(d_1) - Ke^{-rt} \times N(d_2)\right) \quad (3)$$

$$d_1 = \frac{ln(S/K) + [r + (\sigma^2/2)] \times T}{\sigma\sqrt{T}} \qquad d_2 = d_1 - \sigma\sqrt{T}$$

where: $\alpha =$ *Number of new shares / Shares outstanding after the offering*

$S =$ *Spot price of the stock*

$N(\,) =$ *Cumulative normal distribution function*

$K =$ *Subscription price*

$r =$ *risk-free rate*

$\sigma =$ *volatility of the stock*

$T =$ *The time until expiration*

Once the stock and rights are both trading in the market, they should move in tandem, given that essentially it does not matter whether you buy the shares directly or through purchasing rights and exercising them – you end up with the same number of the same exact stock. The relationship between the prices of the stock and subscription right can be illustrated as follows:

$$P_{Stock} = P_{right} + P_{Offer} \quad (4)$$

where: $P_{Stock} =$ *Market price of the stock*

$P_{Right} =$ *Market price of the right to buy one new share*

$P_{Offer} =$ *Subscription price of the newly issued stock*

2.3 Alternative methods of raising equity capital

Gao & Ritter (2010) divide the SEOs into three main categories in respect of their offering methods: fully marketed offerings, accelerated offerings and rights offerings. In addition to these two types of public equity issues (fully marketed and accelerated offerings) and the rights issue to existing shareholders, one method also worth noting is private placements. Private placements in contrast are private equity issues (Hertzel, Lemmon, Linck & Rees, 2002). Following are descriptions of the different equity raising methods mentioned above, with the exception of rights offerings, as they were discussed earlier in a more profound manner.

2.3.1 Fully marketed offerings

Fully marketed offerings bear many characteristics of book-built initial public offerings. They consist of both primary shares issued by the company and existing secondary shares that current shareholders are wishing to sell to the public. The issuing company negotiates with one or more investment banks regarding the marketing and price setting of the offering. In order to print a prospectus for the offering, the lead underwriter(s) conduct their own due diligence on the company to certify its quality. One resemblance with IPOs is that as a part of the process a road show is conducted, to increase interest in the offering and to attract investors. In these road shows there are usually meetings arranged, where the management team of the issuing company, some institutional investors and analysts are present. The lead underwriter, or the bookrunner, simultaneously builds an order book based on investors' demand to determine the offer price. The shares are then distributed to the subscribers by a syndicate of underwriters, according to the book built. (Gao & Ritter, 2010.)

Fully marketed SEOs can be dilutive in nature for the existing shareholders. At least this is the case in terms of their voting power, if common stocks are issued. As the new shares

issued are sold to the public, existing shareholders' ownership of the company decreases as a result of the offering.

2.3.2 Accelerated offerings

Accelerated offerings can be divided into two different types of offerings; bought deals and accelerated book-built offers (Gao & Ritter, 2010). Both of them are also dilutive in nature for the existing shareholders. They are targeted for the public like the fully marketed offerings described before.

A bought deal, or an overnight deal, means the company issuing shares and announcing the amount it is willing to sell to investors. Then investment banks bid for these shares and the highest bid wins. Usually within the next 24 hours after that, the investment bank resells these shares to institutional investors. In an accelerated book-built offer the banks submit a proposal for the right to underwrite the sale of the newly issued shares. Unlike in bought deals, the investment banks do not bid for the shares, but rather set some gross spread price at which they are willing to underwrite the issue. The bank chosen by the issuing company then offers the shares to institutional investors. The process is somewhat slower than in bought deals, but it is still usually completed within 48 hours. The major differences between fully marketed and accelerated offerings are the speed and marketing efforts of the offerings. With fully marketed SEOs the process takes weeks to complete, whereas for accelerated SEOs the time taken is usually from one to two days. The marketing efforts may result in a higher offer price for the shares, but they also cause additional expenses for the issuing company. (Gao & Ritter, 2010.)

2.3.3 Private placements

Private placements, also known as non-public offerings, usually target only a few sophisticated investors that are pre-selected by the issuer of shares. The managers of the

company play a significant role in finding the right investors, as they are often chosen according to the managers' preferences. In contrast to public offerings that are often sold to a large group of investors and thus not really affecting the ownership structure of the company, private placements may change it considerably more. (Wu, 2004.)

Unlike public stock offerings, private placements are often interpreted as being favorable to existing shareholders, despite the fact that they are usually issued at substantial discounts to the current market price (Barclay, Holderness & Sheehan, 2007). There are a couple of hypotheses presented for why this is the case. Wruck's (1989) monitoring hypothesis suggests that investors participating in private placements are active shareholders, who take part in monitoring the management team and corporate efficiency. They also increase the probability of successful corporate takeovers, that create value for all shareholders. Hertzel & Smith (1993) for their part suggest that it is more about certification, as private placements are purchased by investors that can be considered well-informed, and thus their approval is seen as positive for the company. These two views are challenged by Barclay et al. (2007), who find that the monitoring and certification hypotheses are mainly supported by the initial positive stock-price reaction that occurs after the announcement of private placements, but when taking a longer time horizon, it is mainly private placements purchased by the company management team that turn out positive for other shareholders.

2.4 Assumptions of market efficiency

One important aspect to consider when discussing potential mispricing or abnormal returns in the stock market is how the theory of finance relates to them. This means understanding the common assumptions of efficient markets and the relationship between risk and return. Following are brief discussions on two well-known concepts regarding the stock market and capital markets in general – the efficient market hypothesis and the capital asset pricing model.

2.4.1 The efficient market hypothesis

One of the common assumptions in the theory of finance is that the markets are efficiently priced and thus the market prices of securities fully reflect all the information available at all times (Fama 1970). This would imply that investors are not able to earn excess returns on the market with any investing strategy, because the prices of securities are continuously right, never undervalued or overvalued.

The efficient market hypothesis is often traced back to Eugene Fama and his study (1970) on efficient capital markets, in which he discusses the previous theoretical and empirical literature on efficient markets model. He divides the efficient market hypothesis into three different forms of efficiency; weak, semi-strong and strong, based on the quality of information being assessed. These three forms represent the different levels of market efficiency. (Fama, 1970.)

The weak form only requires the information on historical price development or returns of stock to be fully reflected in the current market price. This means that investors cannot use past stock prices, or in other words technical analysis, as the basis of an outperforming trading strategy. Even though some minor inconsistencies were found in the empirical studies done back then, the evidence strongly supported the efficient market hypothesis in its weak form. (Fama, 1970.)

The semi-strong form is a more demanding one, as it assumes that all the obviously publicly available information, like for example announcements of annual earnings or stock splits is efficiently and without a delay priced in (Fama, 1970). The tests under review also supported the semi-strong form of market efficiency, as it seemed evident to Fama (1970) that the stock prices did in fact adjust to new information, like annual earnings announcements, efficiently. This observation would imply that it is not possible for investors to earn excess returns by using strategies that take advantage of the financial information published by the companies. (Fama, 1970.)

The strong form of market efficiency is the most stringent one. It assumes that all the information available, public and even private is at all times reflected in the price of stocks. The strong form is also the most difficult one to test, as insider or otherwise private information affecting stock prices is, by definition, not public information. In the study it was concluded that there probably are some deviations from market efficiency within certain investor groups that have access to private information, but in general the efficient market hypothesis can be viewed as a good first approximation of reality. (Fama, 1970.)

Another idea associated with the efficient market hypothesis is “random walk”. The logic behind this term is that if all new information is immediately reflected in the stock price, then tomorrow’s price changes will only reflect tomorrow’s news. And because news is unpredictable, the future price changes must then be unpredictable as well, and thus prices fully reflect all the information available. (Malkiel, 2003.)

The efficient market hypothesis has received criticism as well, but it often happens in hindsight. To name a couple of them, Shiller (2000) provided evidence of historical price movements that cannot be explained by the company fundamentals, such as the Dot-com bubble. Wilson & Marashdeh (2007) found that it is possible for investors to make systematic excess returns in the short run, meaning that there are brief market inefficiencies, but in the long run the markets are in fact efficient.

2.4.2 The Capital Asset Pricing Model (CAPM)

Another well-known part of financial theory is the Capital Asset Pricing Model (CAPM) that was introduced by Sharpe (1964) and Lintner (1965). The CAPM builds on the Modern Portfolio Theory of Markowitz (1952). It essentially describes the relationship between risk and expected return of financial assets by modeling it for different investment opportunities. (Fama & French, 2004.)

Figure one is an illustration of the relationship between risk and expected return of investment opportunities, telling the CAPM story. The curve *abc* represents combinations of expected return and risk for portfolios of risky assets that minimize variance of return at different levels of expected returns. (Fama & French, 2004.)

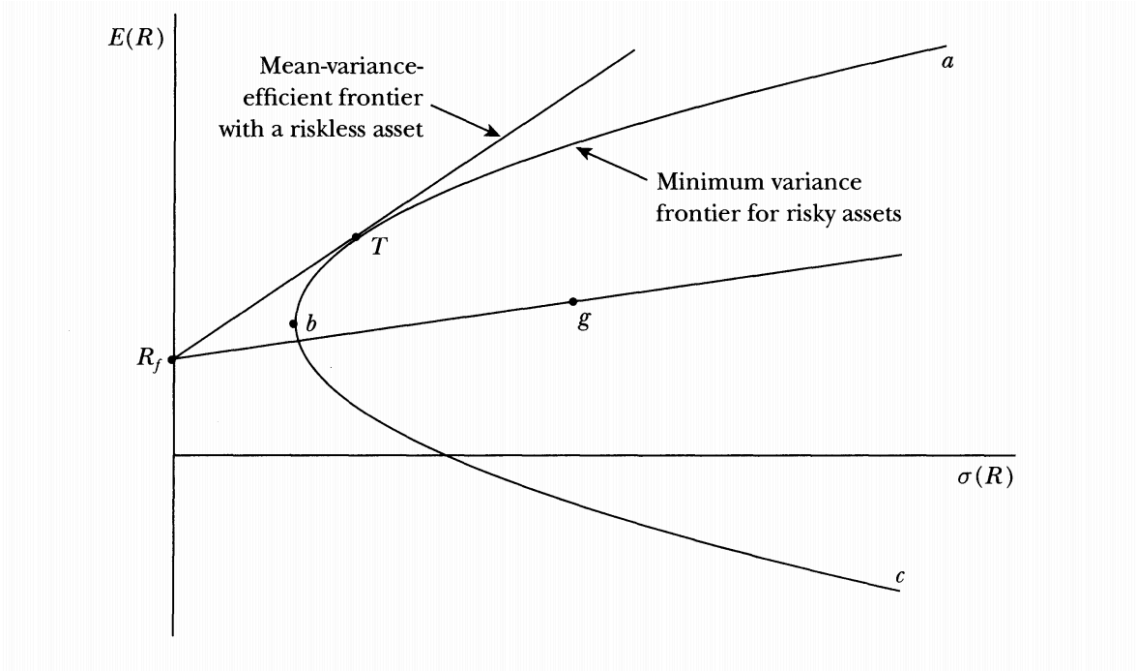


Figure 1 The relationship between risk and expected return (Fama & French, 2004).

The important thing to understand in figure one is that the horizontal axis shows portfolio risk (standard deviation of returns) and the vertical axis shows expected return. In order to gain higher returns, the investor needs to accept higher volatility of returns as well. By adding risk-free return (R_f) as an investment opportunity the efficient frontier takes the form of a straight line. Portfolios combining risk-free return with some risky portfolio *g* plot along the straight line from R_f through ***g***. All the efficient portfolios combine risk-free return and a single risky asset that is the tangency portfolio ***T***. In CAPM all investors see this opportunity, exploit it and form "the market" which is then considered efficient. (Fama & French, 2004.)

The traditional CAPM formula used describes the expected return of a security as a combination of the risk-free rate of return, beta of the security and the market risk premium. The formula is presented below:

$$E(R_i) = R_f + \beta_i \times (R_m - R_f) \quad (5)$$

The expected return of any security ***i*** is thus the sum of risk-free interest rate (R_f) and a risk premium, which is the market beta (β_i) of the security, times the market risk premium $(R_m - R_f)$. Based on this equation and in order to increase the expected return of a security, the investor needs to carry more systematic risk by buying a security with high beta coefficient. (Fama & French, 2004.)

Jensen (1969) came up with a model that measures the portfolio's excess return compared with the expected return predicted by the CAPM. Jensen's alpha (or in short, alpha) is an absolute percentage measure of excess return. It can be calculated for both, individual investments and portfolios, as follows:

$$Jensen's\ alpha = R_p - [R_f + \beta_p \times (R_m - R_f)] \quad (6)$$

where: $R_p =$ Portfolio return

$R_f =$ Risk-free rate of return

$\beta_p =$ Beta of the portfolio

$R_m =$ Market return

3 Literature review

The existing literature on rights offerings related to the stock market can be divided into two main categories. The first one uses event studies to examine whether the stock returns around the event or in the longer term are affected by rights offerings. The other one focuses on the efficiency of securities' pricing by comparing the actual prices to theoretical ones obtained from various pricing methods. Following are brief compilations of each strand of existing literature.

In addition to these two main topics of interest, there is also existing literature that does not fall into either one of them, but it supplements the findings of them by providing more information on rights offerings. However, these studies focus more on the corporate finance side of rights offerings and are discussed in the theoretical framework part of this thesis.

3.1 Stock returns around rights offerings

The early studies on stock returns around rights offerings were conducted in the United States. But as time passed by, the number of rights offerings diminished in the United States, and so did the research on them. The emphasis of more recent studies has been on different international markets, and that is why I consider it practical to separate the two. First discussing the United States based literature as it is the epicenter of financial markets, and then moving on to international evidence on a more global scale.

3.1.1 Evidence from the United States

One of the earlier studies on rights offerings is the one by Nelson (1965), that looks into the price behavior in rights offerings in the United States. Previous studies had investigated stock price effects of dividends and stock splits, so the contribution now was to

investigate whether similar findings could be made about rights offerings as well. The sample of the study consists of altogether 380 stock rights offerings by companies listed on the New York Stock Exchange between 1946 and 1957. Stock price data for the study were obtained at three different points in time: Six months before the initial announcement of the rights offering, on the first day of rights trading and six months after the close of rights trading. The findings show that compared to the first data point, stock prices appreciate by an average of 1.8% when reaching the first day of rights trading but depreciate by an average of 0.2% when the endpoint is reached. The price depreciation is particularly true when a company reduces its cash dividend rate or earnings per share simultaneously. One clear disadvantage of this study is the fact that it only takes into consideration a longer time horizon without thoroughly examining the price effects closer to the event itself. (Nelson, 1965.)

The United States based findings of Nelson (1965) were later complemented by several other studies, including among others the ones by Smith (1977), White & Lusztig (1980) and Eckbo & Masulis (1992). Smith (1977) takes a shorter time horizon and reports that there is a zero abnormal return during the announcement month period. White & Lusztig (1980) contribute to the literature by testing the announcement date effect of rights offerings and conclude that the price reaction signals negative information associated with rights offerings, as there exists an abnormal negative return. The findings of Hansen (1988) and Bae & Jo (1999) also support the negative announcement date effect. Eckbo & Masulis (1992) for their part add that also the abnormal returns on the ERD are negative and statistically significant. In addition, their findings support the idea of a negative announcement date stock price reaction as well.

After the early 1980s rights offerings became rare in the United States (Eckbo & Masulis, 1992). This led to the development that subsequent literature has concentrated more heavily on smaller, international markets. To conclude the United States evidence, the findings of both shorter- and longer-term stock returns imply that the market participants' reaction to a rights offering is negative.

3.1.2 International evidence

In contrast to the largely negative results of the United States, the evidence outside of it a is a lot more mixed, when it comes to stock returns around rights offerings. Most of the studies conducted concentrate on the announcement date effect, but there is also evidence of the ERD effect. Let us first look at the evidence concerning the announcement date effect.

Negative announcement date effect is reported by Slovin et al. (2000), who investigate the United Kingdom evidence of rights offerings in the period of 1986–1994 and find a statistically significant two-day abnormal return of –2.9% to –5%, depending on the type of the offering (insured and uninsured, respectively). Gajewski & Ginglinger (2002) support this finding by providing similar evidence from the French market. They find that over the period of 1986–1996 there was a statistically significant negative abnormal two-day return of approximately 1%. Bolognesi & Gallo (2013) study the Italian market during 2007–2011, and their results show a statistically significant negative abnormal return of 1.37% on the announcement date. In addition, the negative drift continues for ten days after the announcement. Outside of European equity markets, Owen & Suchard (2008) also report a negative announcement date effect in the Australian market. They find that there is on average a statistically significant abnormal return of –1.83% on the announcement date, and that the negative abnormal returns continue for some time even after the initial announcement of a rights offering.

In contrast to the negative findings, there are also reports of positive announcement date returns. Tsangarakis (1996) analyzes the rights issues in Greece from 1981 through 1990, and finds a positive, statistically significant abnormal return of 2.45% on the announcement date. In addition, his findings around the actual event date suggest that in Greece rights offerings are viewed quite positively, as the average cumulative abnormal return during the period from ten days before through ten days after the announcement date equals 12.4%. Similar, though not as extreme results are reported by Bøhren et al.

(1997), who conclude that in Norway the average abnormal return on the announcement date is positive, 0.47%.

Looking at the evidence outside of Europe, it seems like positive announcement date returns are more common, and even more so in less developed markets. Ariff et al. (2007) study the rights offerings of Singapore between 1983 and 2003, finding statistically significant abnormal return of 2.5% on the announcement date and a cumulative abnormal return of 12.5% from 20 days before the announcement through 12 days after it. They also compare the results of periods during economic growth and downturns and conclude that the abnormal returns are significantly higher during periods of economic growth, but positive also during times of economic downturn. Kang & Stulz (1996) report a statistically significant abnormal positive two-day return of 2.21% and three-day return of 2.02% around the announcement date for Japanese companies between January 1st, 1985 and May 31st, 1991. Muradoglu & Aydogan (2003) support the preceding evidence of positive reaction associated with the announcement of a rights offering in Turkey that can be considered a part of both, Asia and Europe, during 1988–1994.

The literature on ERD returns is narrower, possibly because there is no *new* information embedded in the detachment of rights. The price of a stock is supposed to adjust as it does with a detachment of a dividend, so the process is arguably a more technical one. Gajewski & Ginglinger (2002) report statistically significant, negative abnormal returns on multiple event windows in their study of the French market mentioned earlier. They find that regardless of whether the offering is conducted using uninsured or standby rights, the two-day, five-day and twenty-day cumulative abnormal returns after the ERD are all negative and decrease monotonically as the window is prolonged. The sample used by Gajewski & Ginglinger (2002) consists of altogether 197 rights offerings over the 1986–1996 period. Their method for calculating the mean excess returns is the one proposed by Dimson (1979), and they use a parametric test to determine the robustness of their empirical findings. The Japanese evidence by Kang & Stulz (1996) finds no statistically significant abnormal return around the ERD, when investigating the period immediately around the ERD as well as a longer twenty-day post ERD period. Their sample

includes 28 rights offerings over the 1985–1991 period. They use daily excess returns computed by the issuing firm's return minus the return on a control portfolio with a similar Scholes & Williams (1977) beta estimate, and the robustness of their findings is tested by running both a signed-rank test and a student's t-test. Bolognesi & Gallo (2013) find a large (5.85%) positive abnormal return on the ERD in the Italian market. The abnormal returns turn negative quite quickly after the event, and even the cumulative abnormal returns turn negative nine days into trading. Their sample consists of 70 rights offerings by 63 different Italian firms over the 2007–2011 period. They use the traditional market model to compute abnormal returns, while the statistical significance of the findings is tested by calculating the simple t-statistics for them.

3.2 Pricing efficiency of rights offerings

The possible inefficiencies and mispricing of rights offerings can be studied by somehow taking a stand on the relative prices of the stock and the theoretical or implied value of it. Or alternatively, the observed and theoretical values of the subscription rights. There are some studies examining just that using different methods and even previous, though quite old, Finnish evidence by Berglund & Wahlroos (1985) is available. However, it can be stated that most articles concentrate on the event studies around rights offerings, rather than the efficiency of their pricing action.

3.2.1 Evidence from the United States and other international markets

Looking at evidence from the United States, Bae & Levy (1994) test how well the alternative Black-Scholes option pricing models modified by Smith (1977) and Galai & Schneller (1978) work in determining the prices of subscription rights. Their sample for the test consists of United States rights offerings of NYSE or AMEX listed companies from the beginning of 1968 until the end of 1985, altogether 177 observations meeting the requirements. The findings are quite straightforward, as it seems evident that the modified

Black-Scholes option pricing models on average overprice the rights both on the rights-on date and the ERD, compared with the observed prices. The average overpricing is 13.5% on the rights-on date, 10.6% on the ERD and 13.9% during the entire offering period. This of course means, that the rights are trading lower than their theoretical prices are. They suggest that some of this deviation could be due to volatility changes associated with the raises of new equity capital. (Bae & Levy, 1994.)

Chan (1997) provides evidence of the importance of choosing the volatility used, as he studies the pricing of underwritten Australian rights offerings from July 1987 to June 1993. He shows that if one uses the Black-Scholes option pricing model to value the rights, the pre-announcement volatility provides significantly different results compared with when the actual volatility during the underwriting period is chosen. Pre-announcement volatility overstates the excess returns that the underwriter of the offering earns. (Chan, 1997.)

Poitras (2002) shows that in Singapore, the subscription rights of 52 offerings during 1992–1998 trade at a level that violates the short arbitrage boundary of a European call option on a non-dividend paying stock over 90% of the total trading time. During this period the execution of short arbitrage was not possible due to the rules of the Stock Exchange of Singapore, which needs to be taken into account. It is noted however, that the violations are large enough for market makers and existing shareholders to try and benefit from them by selling the stock, buying the rights and exercising them. The transaction costs and possible tax ramifications need to be taken into consideration, as well as the cumbersome nature of the process of simultaneously executing the trades. (Poitras, 2002.)

Sukor & Bacha (2010) use both the adjusted Black-Scholes option pricing model and the more traditional implied rights valuation model to study the pricing efficiency of rights offerings in Malaysia during 1998–2005. Their findings suggest that the rights trade at a significant premium relative to their theoretical values, which is in contrast to the findings in the United States and Singapore presented above. Another observation worth

mentioning is that there is no meaningful difference between the results that are obtained by using the theoretical values of adjusted Black-Scholes option pricing model to those of the implied rights valuation model. Sukor & Bacha (2010) argue that the almost identical results of these two methods has to do with the short trading period of subscription rights. In addition, they state that since the rights are in almost all cases issued at deep discounts and are thus essentially deep in-the-money call options combined with the very short time to maturity, the time value of the rights becomes negligible. The conclusion is that significant mispricing exists in the subscription rights and it is quite heavily tilted towards overpricing of the rights. (Sukor & Bacha, 2010.)

3.2.2 Finnish evidence

Berglund & Wahlroos (1985) are the first ones to examine the pricing efficiency of rights offerings in the Helsinki stock exchange. In their study they use the Black-Scholes option pricing model to test whether the rumors circulating among brokers and speculators at that time, that large inefficiencies exist in the rights issue market hold true. Their data consists of altogether 33 rights offerings on the HESE Big board between the 1st of September in 1977 and the 1st of October in 1981. They use weekly closing prices for both the stocks and the subscription right coupons. (Berglund & Wahlroos, 1985.)

In the tests Berglund & Wahlroos (1985) enter into a long or a short position in the option (subscription right), depending on its market value relative to its theoretical value obtained from the Black-Scholes option pricing model. For their long or short positions, they test two different trading strategies. First one is a buy-and-hold strategy, where they either exercise or sell the option position at maturity, depending on the option price. After deducting transaction costs, they find that no positive excess returns are attainable. Buy-and-sell strategy, where the positions are adjusted on a continuous basis based on available arbitrage opportunities produce similar outcomes. The conclusion of this study is that even if a trader is able to avoid all transaction costs, he cannot earn significantly

positive excess returns without hedging the position at the time of the rights issue as well. (Berglund & Wahlroos, 1985.)

As Berglund & Wahlroos (1985) point out, the transaction costs at that time were quite high, trading volumes low and short selling of all securities including stocks and rights was prohibited. So, somewhat greater frictions existed in the financial markets compared with the markets of today. Today, transaction costs are significantly lower and short selling of securities is only limited, not entirely prohibited.

4 Data description

The data for this study is collected from the Nasdaq Helsinki database. The list of rights offerings between years 2005 and 2019 is obtained by going through both company stock exchange releases and historical price data of equity rights and warrants, both provided by Nasdaq Helsinki. With the price data of stocks, subscription rights as well as the OMXHGI index that is used for obtaining data of the overall market, logarithmic daily returns are computed. General information on for example the terms of the offerings, the total cash raised as well as important dates are collected from company stock exchange releases.

Rights offerings of Finnish companies listed on Nasdaq First North Growth Market are excluded from the analysis due to their often relatively small size and poor liquidity. For the same reasons, the same is done for companies listed on Nasdaq Helsinki, that had a market capitalization of 15 million euros or lower at the time of announcing their rights offerings. This excludes approximately the bottom 10% of all rights offerings that would otherwise be included in the study. In addition, companies that only have their secondary listing in Nasdaq Helsinki and primary listing somewhere else are left out, as most of their trading volume takes place in the stock exchange where they are primarily listed.

The remaining sample consists of altogether 50 observations of 35 different companies, that raised a little less than 9.3 billion euros through their rights offerings. The complete list of observations can be seen in table one. On three of the rights offerings, Stockmann (2009), Bank of Åland (2011) and Oriola (2015), the companies had two different sets of shares that both had their own rights distributed to the shareholders. On these three occasions only the more liquid set of shares is taken into consideration.

The highest number of observations is in 2009, in the aftermath of the global financial crisis, when altogether nine companies issued new equity via rights offerings. In both 2005 and 2019 there is only one observation each year, which means that these were the least active years. On average, there are approximately three observations per year.

Table 1 Rights offerings in Nasdaq Helsinki, 2005–2019

Year	Company	MEUR	Year	Company	MEUR
2005	Pohjola Bank	724.2	2011	Bank of Åland	30.3
2006	Citycon	75	2012	Outokumpu	1006
2006	Sanoma	1	2012	Technopolis	31.8
2006	Tiimari	7.5	2012	Tecnotree	5.9
2007	Sponda	247	2012	Citycon	90.7
2007	Aspocomp	25	2013	Citycon	200
2007	Citycon	99	2013	Talvivaara	261
2007	Finnair	248	2013	Finnlines	28.8
2008	Technopolis	59.6	2013	Technopolis	100
2008	Terveystalo	14.3	2014	Cencorp	4.9
2009	Nordea Bank	2500	2014	Outokumpu	650
2009	Pohjola Bank	307.9	2014	Citycon	206.4
2009	Sponda	208.2	2014	Lemminkäinen	29.3
2009	Finnlines	33.7	2015	Oriola	75.6
2009	Stockmann	44.9	2015	Metsä Board	100
2009	Ilkka-Yhtymä	39.9	2015	Citycon	600
2009	Amer Sports	150	2015	SRV	50
2009	Kemira	200	2015	Ixonos	8.2
2009	HKScan	78	2016	Sponda	220.8
2010	Ixonos	6	2016	Etteplan	14.4
2010	Suominen	9.7	2016	Technopolis	125
2011	Oral Hammaslääkärit	6	2017	Qt Group	15.3
2011	Cencorp	3.3	2017	Digia	12.5
2011	Cramo	100	2018	Ahlström-Munksjö	150
2011	Aspo	20	2019	Glaston	34

There is great variety in the funds raised as well. The figures under “MEUR” in table one mark the gross proceeds of each offering, measured in millions of euros. On average, the gross proceeds of a rights offering are 185 million euros, while the median is 67 million euros. The minimum amount raised is Sanoma’s offering of one million euros in 2006, that was actually not a traditional equity issuance to either strengthen the balance sheet or finance growth investments. Sanoma’s offering was carried out due to combining two series of shares, as the holders of the shares with more voting rights were given regular shares in exchange. As a compensation for their diminished voting rights, a rights offering entitling them to subscribe for additional shares was conducted. The largest offering took place in 2009, as Nordea Bank raised 2.5 billion euros of additional equity.

The detailed industry breakdown of the sample can be seen in figure two below. It is noteworthy that there are observations from an ample variety of different sectors, even though the real estate sector stands out from the rest with its 13 observations. Worth mentioning are also the technology and basic resources sectors, that both fit into the top three with their six and five observations, respectively.

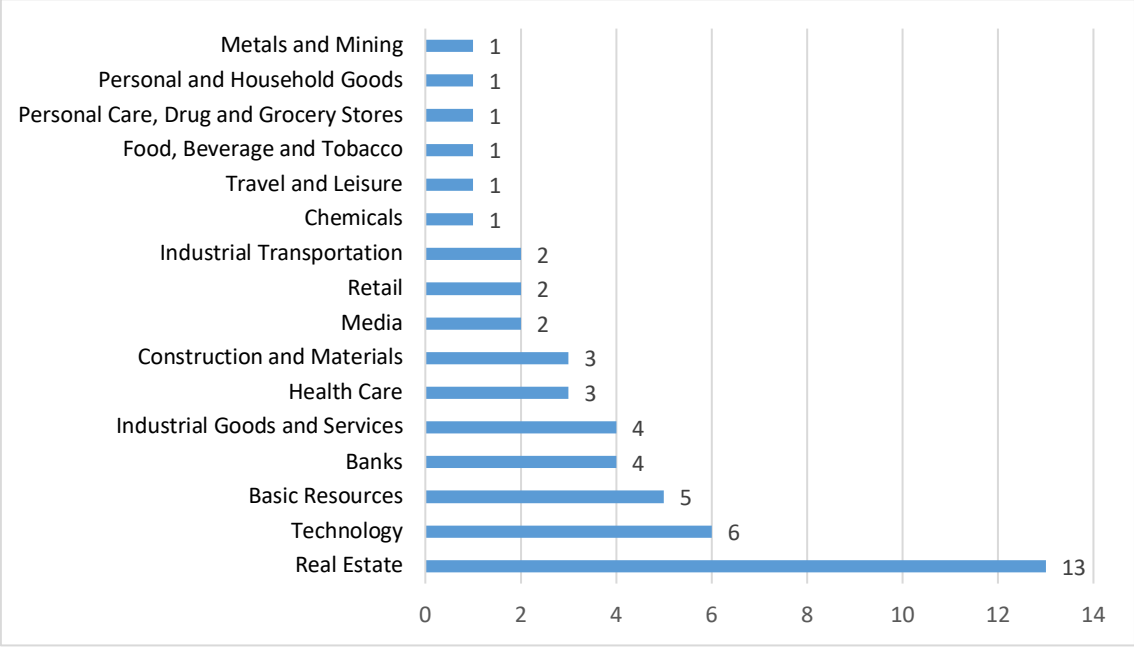


Figure 2 Industry breakdown of the sample, number of observations

5 Methodology

Following are the methodological approaches used in this thesis. First there is an introduction to event studies and their characteristics, as well as the ways of measuring abnormal stock returns and their statistical significance in this thesis. In the chapter after that comes a brief description of the intended approach to measure the pricing efficiency around rights offerings.

5.1 Event study

The earliest history of event studies in finance dates back to the early 1930s, as Dolley (1933) examines whether stock prices react to stock splits. A couple of decades later in the 1960s, the event study methodology that is still used today was introduced by Ball & Brown (1968) and Fama, Fisher, Jensen & Roll (1969). Ball & Brown (1968) study the adjustment of stock prices to earnings surprises around the release of annual reports, whereas Fama et al., (1969) look into the unusual behavior of stock returns around stock splits and whether that can be attributed to simultaneous dividend increases.

The procedure of an event study is not always the same, but a certain flow of analysis is often present. This basic structure of event studies is laid out by MacKinlay (1997), who divides the process into seven steps:

1. Define the event of interest and the event window
2. Determine the selection criteria for the inclusion of a given firm in the study
3. Define the methodology of measuring abnormal returns
4. Define the estimation window to determine normal performance parameters
5. Calculate the abnormal returns and determine their statistical significance
6. Present the empirical results
7. Interpretation and conclusions

The event of interest in this case is the detachment of subscription rights in a rights offering, and the period around it. The selection criteria for the firms included in the study was presented earlier in the data description chapter, and the timeline as well as the methodology to measure abnormal returns and their statistical significance are presented next.

5.1.1 Timeline of an event study

In setting the timeline for an event study, first the observation interval needs to be defined. In this study the interval is set to one day, as daily stock returns are used. In addition, the estimation and event windows need to be chosen. An illustration of the timeline used for this event study can be seen in figure three below. The estimation window is used as a tool to estimate the normal performance of each stock, so that the possible abnormal performance can later be measured. The estimation window is usually chosen so that it takes place prior to the event itself, and it is typical for the estimation and event windows not to overlap. The benefit of separating the two is that the estimation of a stock's normal return is not influenced by its returns around the event, thus improving the quality of results obtained. (MacKinlay, 1997.)

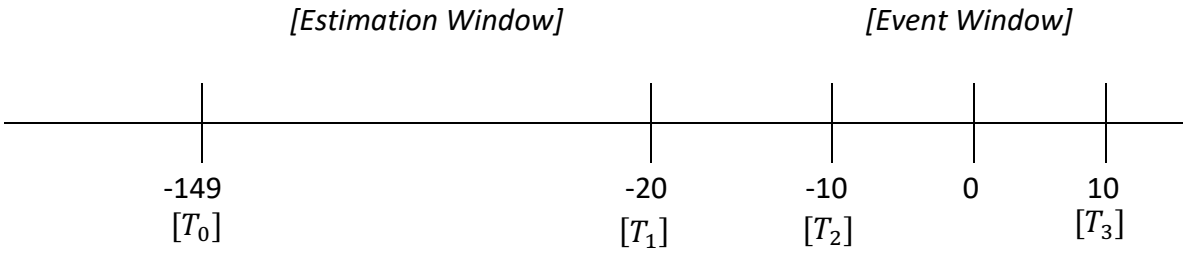


Figure 3 Timeline for the event study

The event window includes the event day and typically also a selected number of days both prior to the event and after it. Lengthening the event window allows further

examination of the period surrounding the actual event date, if this is seen as beneficial. This way it is possible to study several time frames within the event window, as is done in this thesis as well. Sometimes also a third window called the post-event window is used to provide more data on the stock's normal performance, but that is not necessary for the purposes of this study. (MacKinlay, 1997.)

Let us now discuss the timeline for this study that was illustrated in figure three a little bit more in detail. $[T_0]$ 149 days prior to the event (0) denotes the beginning of the estimation window. The last day of the estimation window is marked with $[T_1]$ at 20 days prior to the event, meaning that the total length of the estimation window is 130 trading days. According to MacKinlay (1997), this is sufficient for estimating the normal performance of stocks.

The event window $[T_2, T_3]$ from 10 days prior until 10 days post the event date is a traditional one used in event studies, but not the only option. Shorter, longer and even asymmetric event windows can be used, if it is seen beneficial for the study. For example, Bolognesi & Gallo (2013) who study the ERD effect on the Italian equity market, use an asymmetric event window [-10, 14]. However, there is no special need for such measure in this paper, which is why the traditional [-10, 10] event window is chosen. Within the event window, the average abnormal returns for each day are computed and presented, as well as several cumulative average abnormal returns of different time frames.

5.1.2 Measuring abnormal returns

Among others, MacKinlay (1997) and Binder (1998) discuss the alternative methodological approaches for measuring abnormal returns in event studies. The following four equations (7–10) are laid out in their articles. The event study related to stock returns on and around the ERD is conducted by measuring the (cumulative) abnormal stock returns. It is good to note that on the ERD the stock return is also adjusted for the detachment of the rights (TERP), as was described in equation one. The daily abnormal return

for stock $\boldsymbol{i}$ of the sample at time $\boldsymbol{t}$ can be calculated by subtracting the expected return from actual returns, as follows:

$$AR_{i,t} = R_{i,t} - E\left(R_{i,t}\right) \tag{7}$$

To estimate the expected (or normal) returns of equation 7 for each stock, a traditional market model is used. The use of a simple market model is justified, as the gains from employing multifactor models are limited for event studies (MacKinlay, 1997). It is measured by running an ordinary least squares regression to estimate parameters $\boldsymbol{\alpha_i}$ and $\boldsymbol{\beta_i}$ seen in equation 8 below. $\boldsymbol{R_{m,t}}$ denotes the actual reference market return at time $\boldsymbol{t}$ and $\boldsymbol{\varepsilon_{i,t}}$ is the zero mean disturbance term. As the data for this regression, daily returns of each stock and the reference market (OMXHGI) during the estimation window are used.

$$E\left(R_{i,t}\right) = \alpha_i + \beta_i \times R_{m,t} + \varepsilon_{i,t} \tag{8}$$

$$E\left(\varepsilon_{i,t} = 0\right) \qquad Var(\varepsilon_{i,t}) = \sigma_{\varepsilon_i}^2$$

To calculate the average abnormal return of $\boldsymbol{N}$ stocks for time $\boldsymbol{t}$ of the event window, the following formula can be used:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t} \tag{9}$$

And finally, to get an idea of the abnormal returns over different periods of time $\boldsymbol{t}$, the cumulative average abnormal returns starting from day $\boldsymbol{t_1}$ and ending at day $\boldsymbol{t_2}$, the following formula is used:

$$CAAR_{t_1,t_2} = \sum_{t_1}^{t_2} AAR_t \tag{10}$$

5.1.3 Statistical significance of empirical results

In order to measure the statistical significance of average abnormal returns and cumulative average abnormal returns, a test is needed. The methods available can be divided into parametric and nonparametric tests. For a long time, parametric event study tests such as the Standardized Residual Test by Patell (1976) and the Standardized Cross-Sectional Test by Boehmer, Musumeci & Poulsen (1991) that utilize standardized abnormal returns, were widely preferred over nonparametric tests (Kolari & Pynnönen, 2011).

According to Kolari & Pynnönen (2010), the problem with nonparametric tests was that their efficacy diminished significantly when extending to lengthier tests of cumulative abnormal returns. On the other hand, the benefit of using nonparametric tests on short, single day abnormal returns is that they do not make the same assumption as parametric tests, that stock prices are normally distributed. Brown & Warner (1985) among others conclude that they are not, which causes the nonparametric tests to dominate the parametric tests in studies concentrating on single day abnormal returns. It has also been shown that due to these limitations, parametric tests reject the null hypothesis of no abnormal returns too often (Kolari & Pynnönen, 2011.)

To overcome the pitfalls of traditional nonparametric tests, Kolari & Pynnönen (2011) propose a generalized rank testing procedure (GRANK), based on the previous rank testing approaches of Corrado (1989) and Corrado & Zivney (1992). Their simulations show that consistent with earlier evidence, the traditional nonparametric statistics are robust relative to parametric tests for single day events as well as short cumulative abnormal returns but start losing their efficacy when the event windows are prolonged. In comparison, the proposed statistics (GRANK-Z and GRANK-T) overcome the problem, showing robustness for both single day and cumulated event effect testing. In addition, their empirical power is also greater than that of parametric tests. (Kolari & Pynnönen, 2011.)

The difference in performance of GRANK-Z and GRANK-T comes mainly from the fact that GRANK-T is more robust against the possible cross-correlation of returns than

GRANK-Z. Thus, GRANK-T overcomes the problem of event day clustering, which happens when the event days are near each other or even the same across the sample. Event day clustering may induce cross-sectional correlation of abnormal returns. However, in the case of cross-sectionally independent returns, there is no difference between the two proposed statistics. (Kolari & Pynnönen, 2011.)

In order to test statistical significance of the results of this event study, the nonparametric GRANK-T is used. The choice between the two robust GRANK measures arises from the fact that the sample used contains a couple of observations that have clustered event days, thus possibly causing cross-sectional correlation. The greater empirical power and missing assumption of stock returns being normally distributed result in GRANK-T to be preferred over the traditional parametric tests. In addition, GRANK-T statistic is robust to return serial correlation and event-induced volatility, which makes it an attractive choice to test statistical significance (Kolari & Pynnönen, 2011).

5.2 Pricing efficiency of subscription rights

As was discussed in already in the theoretical framework chapter, there are basically two alternative methods for valuing subscription rights. One way of doing it is to use a simple implied value model, where the rights price is derived using the current market price of the stock and the exercise price of the new stocks offered to investors. The formula is then simply a modified version of equation four, outlined as follows:

$$P_{right} = P_{Stock} - P_{Offer} \tag{11}$$

where: $P_{Stock} =$ *Market price of the stock*

$P_{Right} =$ *Market price of the right to buy one new share*

$P_{Offer} =$ *Subscription price of the newly issued stock*

A more complex way of doing the calculation is to use a modified version of the Black-Scholes option pricing model, as was presented in equation three. However, as Sukor & Bacha (2010) conclude in their study on Malaysian rights offerings, the difference between the results of these two alternative methods are negligible. This has to do with the short trading period of subscription rights, which in Finland typically means about 6 to eight trading days, although there are some exceptions in either direction. Also, as the offerings are usually carried out at significant discounts in Finland, the time value of the rights becomes negligible. Thus, the methodology used for determining the theoretical value of rights in this study is the simple implied value model presented above in equation 11.

To find out the degree of mispricing of rights in Finland, a calculation also run by Sukor & Bacha (2010) and inspired by MacBeth & Merville (1979) is used. They define the mispricing of each right as

$$\%\, mispricing = ln\left[\frac{R_i^{(a)}}{R^*}\right] \times 100 \tag{12}$$

Where $\boldsymbol{R_i^{(a)}}$ denotes the average market price of rights of firm $\boldsymbol{i}$ and $\boldsymbol{R^*}$ is the average theoretical price of rights from equation 11. The averages are calculated using daily closing prices. One of the benefits of using average measures is the fact that the length of trading period somewhat varies across the sample. By averaging, the results become more comparable between each other.

In addition, a sense of the relative price action of both the existing stock and the newly issued stock purchased via buying and exercising rights is obtained. This is done by computing the cumulative returns of them both from the beginning of rights transferability until the closing prices of day 7 of it. The reason for adding this in the study is to get a grip of how the price action develops during the fairly short period of rights transferability, and whether there are any differences between the actions of the actual and implied stock prices.

6 Empirical results

As with the literature review and methodology description, the empirical results have also been divided into chapters concerning the ERD event study and pricing efficiency of subscription rights separately. First, we will go through the results of the event study, looking into the daily average abnormal returns of the sample collected, as well as several periods of cumulative average abnormal returns within the event window determined earlier. After that, a look into the extent of mispricing of Finnish rights is taken. In addition, implications of the empirical findings of this study for are discussed from the viewpoint of investors.

6.1 The ex-rights date effect

The average abnormal single day returns on and around the ERD can be seen compiled in table two. In addition, the cumulative abnormal returns are marked running throughout the event window. There are several observations to be made. First of all, none of the ten days prior to the event date show statistically significant abnormal returns even at the 10% level, which is the weakest level of statistical significance used in this study. On the ERD when the subscription rights become detached, there is a 3.31% positive abnormal return. Statistically significant at the 1% level. So even though the event is known in advance and should not come as a surprise for the market participants, there seems to be an extraordinary reaction to it.

If we then take a look at the period post the event day itself, the results turn largely the other way around. Immediately after the event day there is a weakly statistically significant, small negative abnormal return, followed by two days of not significant abnormal returns. On the fourth day after the event, however, begins a streak of large negative abnormal returns. On the fourth day the abnormal return is –1.26%, which is significant at the 1% level. On the fifth and sixth trading days, the abnormal returns are –3.27% and –1.82% respectively, both of which are also statistically significant at the strong 1% level.

Table 2 AARs around the ex-rights date, Nasdaq Helsinki 2005–2019

Period	AAR	GRANK-T	CAAR
-10	0.0000	0.0000	0.0000
-9	-0.0012	-0.7183	-0.0012
-8	-0.0027	0.2051	-0.0039
-7	-0.0007	-0.5423	-0.0046
-6	-0.0007	0.0040	-0.0053
-5	-0.0006	-0.3377	-0.0059
-4	0.0022	0.6711	-0.0037
-3	0.0004	-1.1969	-0.0033
-2	0.0067	1.3234	0.0034
-1	0.0001	1.1584	0.0035
0	0.0331	3.0624 ***	0.0366
1	-0.0020	-1.9174 *	0.0346
2	-0.0052	-1.4220	0.0294
3	-0.0083	-1.4791	0.0211
4	-0.0126	-2.8551 ***	0.0085
5	-0.0327	-5.1735 ***	-0.0242
6	-0.0182	-5.0721 ***	-0.0424
7	-0.0112	-2.5467 **	-0.0536
8	-0.0031	-1.1133	-0.0567
9	0.0069	2.1104 **	-0.0498
10	-0.0052	0.1004	-0.0550

Significant at the 0.01 level ***

Significant at the 0.05 level **

Significant at the 0.10 level *

The abnormal return of -1.12% on day seven completes the streak, even though it is only significant at the weaker 5% level. There is also one positive (0.69%) abnormal return on day nine after the event, but overall, the post-event results lean quite clearly towards negative abnormal single day returns. In figure four, an illustration of the development of cumulative abnormal returns throughout the event window can be seen. Findings related to them will be discussed next in more detail.

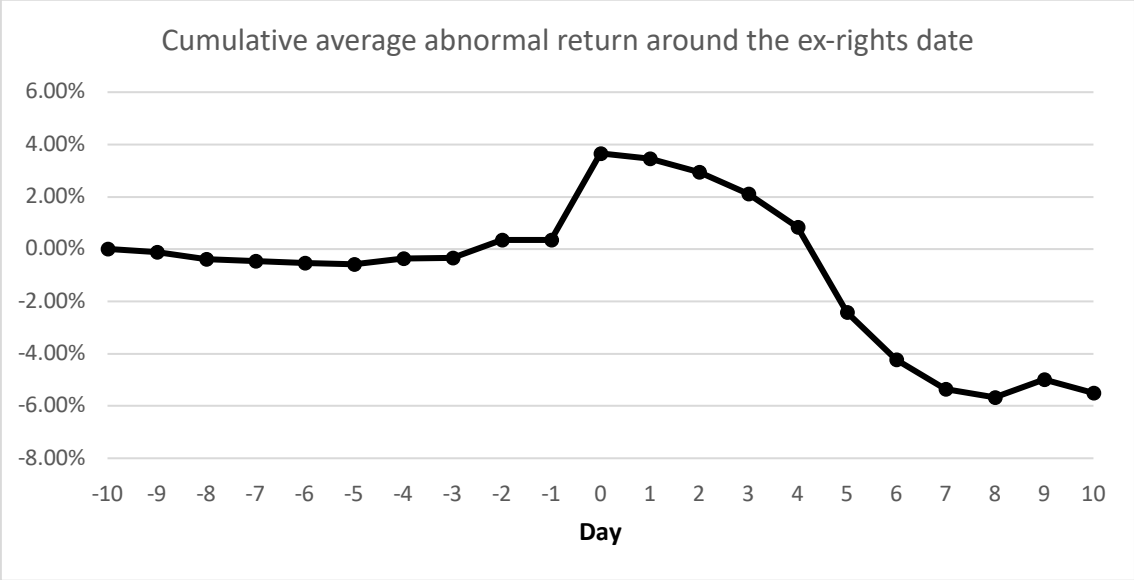


Figure 4 CAAR around the ex-rights date, Nasdaq Helsinki 2005–2019

Table three presents several periods of cumulative abnormal returns within the event window. First of all, the cumulative abnormal return from the beginning of the event window until the end of it equals –5.50%, statistically significant at the 1% level. If we only take the pre-event period into account but also include the event date, the cumulative abnormal return is a positive 3.66%, significant at the 5% level. The same observation can be made about the longer period of [-5, 5], though the abnormal return is less extreme, –1.89%. Immediately around the event date in window [-1, 1], the result is positive (3.12%) but only significant at the 10% level, just barely outside of the 5% level.

Table 3 CAARs of selected periods within the event window

Period	CAAR	GRANK-T	
[-10, 10]	-0.0550	-4.1115	***
[-10, 0]	0.0366	2.2214	**
[-5, 5]	-0.0189	-3.0891	***
[-1, 1]	0.0312	1.9752	*
[0, 10]	-0.0585	-5.0974	***
[1, 10]	-0.0916	-5.8509	***

Significant at the 0.01 level ***
Significant at the 0.05 level **
Significant at the 0.10 level *

Given periods more concentrated on the post-event time, the results are significantly negative. Including the ERD to the post-event window [0, 10], the cumulative abnormal return is –5.85%, but when the ERD is excluded [1, 10], the return is –9.16%. Both of these results are statistically significant at the 1% level. But what if we run the same CAAR-tests dividing the sample in half by sorting it in regard to market capitalizations, thus creating large and small cap subsamples?

Table four presents these results of large and small cap groups, that include the 25 largest and smallest companies respectively. The exact division of companies used can be found in the appendix. Some noteworthy differences are that in the sample of large cap stocks fewer periods have statistically significant abnormal returns. Immediately around the event date [-1, 1] there is no abnormal return in either subsample. The post event date [1, 10] negative drift remains intact, totaling –3.03% for large cap stocks and –15.29% for small cap stocks, both significant at the 1% level. In the subsample of small cap stocks, the results remain more like those of the full sample in terms of statistical significance, but the abnormal returns are generally more extreme.

Table 4 CAARs of large cap and small cap subsamples

Large cap

Period	CAAR	GRANK-T	
[-10, 10]	-0.0015	-1.0102	
[-10, 0]	0.0288	1.4267	
[-5, 5]	-0.0025	-1.5054	
[-1, 1]	0.0187	1.3877	
[0, 10]	-0.0139	-1.7859	*
[1, 10]	-0.0303	-2.8583	***

The 25 largest companies, sorted by market capitalization

Small cap

Period	CAAR	GRANK-T	
[-10, 10]	-0.1086	-4.4744	***
[-10, 0]	0.0443	1.7421	*
[-5, 5]	-0.0353	-2.7712	***
[-1, 1]	0.0437	1.5544	
[0, 10]	-0.1031	-5.2993	***
[1, 10]	-0.1529	-5.5670	***

The 25 smallest companies

Significant at the 0.01 level ***
Significant at the 0.05 level **
Significant at the 0.10 level *

6.1.1 Discussion on the findings

Considering the fact that on average the ERD seems to offer a large positive abnormal return in the Finnish stock market, it is useful to try and come up with possible factors that might play a role in this phenomenon. After all, the event date does not contain any new information about the company. The change is more like a technical one, comparable with other company events like dividend detachment or stock split, where the stock price should adjust accordingly, given no abnormal return. On the ERD, stock price of the company in question should adjust to its theoretical ex-rights price, while also factoring in the market return, given no new fundamental information about the company. As the theoretical ex-rights price is basically without exception lower than the preceding stock price, the adjustment in absolute terms should be a negative move in the stock price.

In Finnair's rights offering in 2020 at least one of the major Finnish retail brokerages, OP Financial Group, mistakenly displayed to its customers that the stock was down on the ERD, which was true without adjusting for the detachment of subscription rights. On their trading platform, the percentage change shown in Finnair's stock was computed by simply comparing the price that day with the closing price of the previous day, when the rights were still attached. As there was a deep rights offer discount used in the offering, the absolute change in stock price on the ERD was and was supposed to be considerably negative. But in reality, when adjusting for the detachment of subscription rights, the stock was up significantly. The largest net buyers of the stock that day were investors using precisely the broker suffering from this problem, while other brokerages seemed to successfully account for the adjustment they were supposed to make, showing that the stock was actually moving higher. The same exact thing occurred in Lehto Group's offering later in the fall. Although Finnair's and Lehto Group's rights offerings have nothing to do with the sample used in this study, they are an example of a mistake this kind of a technical adjustment may induce even for the brokers' systems, possibly confusing investors and causing them to think that the stock is moving to the opposite direction it actually is. A misunderstanding of this sort may lead to investors, and particularly less sophisticated investors, to generate additional buying pressure in the stock.

The large and statistically significant negative abnormal single day returns coincide with the typical start of subscription rights becoming transferable in the open market. Although there is some minor variation, in almost all rights offerings included in this study the first day of subscription rights trading is a week after the ERD, meaning about four trading days in between. What the beginning of trading with subscription rights does is that it creates an alternative way of purchasing the common stock. As the window during which the rights are transferable is quite short (about one week), the investors not willing to exercise some or all of their rights to purchase additional shares of the company need to sell their rights quite quickly in the market. Especially in offerings with little interest towards the company, it is possible that the supply of rights exceeds the demand, which may cause the price of subscription rights to drift lower. After all, for an investor not willing to exercise the rights, any price is better than remaining passive, which would lead to the investor taking both the dilution and financial loss in their full magnitudes.

If this thought is taken one step forward, excessive selling pressure in rights that may result in their price to drift lower, might indirectly cause some downward pressure in the stock price as well. As the two, old existing stock and newly issued stock via exercising right(s) should trade on par with each other, the potential short-term price spread between these two may induce market participants to try and exploit it. If the theoretical or implied price of newly issued stock is lower than the market price of the existing stock, the way to try and exploit this would be to sell (short) the existing stock and buy rights to purchase the newly issued stock. On a large scale, this kind of behavior could potentially result in abnormal negative stock returns.

One important issue to address is the comparison of empirical findings with those of the previous research discussed earlier, and what might explain the differences or similarities found. The positive abnormal return on and immediately around the ERD is consistent with the findings of Bolognesi & Gallo (2013) on the Italian market but deviates from the negative findings of Gajewski & Ginglinger (2002) on the French market and no abnormal returns of Kang & Stulz (1996) in Japan. This study applies a similar approach in computing the abnormal returns as Bolognesi & Gallo (2013) using a simple market

model to measure the normal performance, whereas the other two previous studies use different approaches. Gajewski & Ginglinger (2002) apply the Dimson's (1979) method for calculating mean excess returns, and Kang & Stulz (1996) use daily excess returns computed by the issuing firm's return minus the return on a control portfolio with a similar Scholes & Williams (1977) beta estimate. These different approaches may partially explain the different findings obtained. It is also good to note that the French evidence includes quite significantly more observations (197) than the Finnish, Italian and Japanese studies; 50, 70 and 28 respectively, which adds to the differences between the studies and their settings.

What is more consistent with the previous research are the negative abnormal returns during the post ERD period. Both of the European studies by Bolognesi & Gallo (2013) and Gajewski & Ginglinger (2002) document similar findings, while the Japanese evidence of no abnormal returns by Kang & Stulz (1996) concerns also the longer-term post ERD period. Given that the rights are transferable in all of these countries (Holderness & Pontiff, 2016), the period of rights transferability is included in the post ERD periods. As discussed above, the start of rights trading might partially drive the negative drift seen. It is possible that the supply of rights exceeds the demand during the short period of rights transferability, which may cause the price of subscription rights and indirectly the stock price to drift lower. For some reason in the Japanese market the stocks of those companies carrying out rights offerings do not seem to experience a similar negative drift after the ERD. The study by Kang & Stulz (1996) uses the smallest sample and as already stated, quite a different approach in measuring abnormal returns. In addition, the geographical and cultural differences when comparing the European evidence with that of the Japanese evidence might play a role.

6.1.2 Implications for investors

As has been described above, there is evidence of abnormal stock returns around Finnish rights offerings, which could present an opportunity for investors to try and benefit from

them. Especially investors engaging in special situations investing may find the short-term anomalous stock returns interesting. However, the ERD positive abnormal return is somewhat problematic to try and exploit, as the subscription rights distributed to investors also affect the total return equation. So even though the stock price does not seem to adjust as expected to the detachment of rights, the return eventually obtained by the investor depends on what happens to the price of rights.

The large, negative abnormal returns after the ERD are a little bit different in nature for investors, as the total return obtained is not directly affected by what happens to the rights' price. The negative cumulative average abnormal return of over nine percent from day one until day ten after the ERD is a significant one. The obvious way of exploiting this sort of price action would be to sell short the stock, but that has its limitations as well. In Finland short selling is quite restricted, and the option is usually available only for companies trading at quite large market capitalizations. And as was presented, this negative abnormal return was significantly more extreme among smaller companies, but it also exists in large cap stocks. But even if the option of selling the stock short is not available, it seems clear that holding the stock results in large and significant underperformance on the days following the ERD. This should be avoided by the investors, but it needs to be said that this way of thinking does not take into account the possible tax ramifications or trading costs that may result from taking the action.

To sum up, even if it seems evident that certain abnormalities do exist, it is important for market participants to understand that the possibility of exploiting them, at least to their full extent, is limited and uncertain. Nonetheless, this abolishes neither the fact that return on the ERD is abnormal and positive, nor that there exists a large negative post ERD drift, resulting in significant underperformance relative to the overall market.

6.2 Mispricing of rights

In table five, the results concerning the extent of rights mispricing of the sample are presented. To clarify, when the extent of mispricing is found to be negative, it means that the average market price has been lower than the average theoretical price during the period of rights transferability. Naturally, the opposite is true for those offerings where positive mispricing is found. Three observations are denoted with “NM”, not meaningful, which signals negative theoretical rights price. On these occasions, the existing stock has on average traded below the exercise price of the newly issued stock, which implies that whatever the market price of rights is, it is above the theoretical price and thus the rights are overvalued on the market.

Altogether 32 of the total 50 observations have had a negative extent of rights mispricing, one observation has had no mispricing and on 17 occasions the rights have on average traded above their theoretical or implied value. It is also noteworthy that in those cases where the extent of mispricing has been positive, it has generally not been large. And those observations where the positive mispricing has been large are mostly small cap stocks. The largest negative extents of mispricing are also small cap stocks, but fairly large negative spreads exist also in large cap stocks such as Nordea, Outokumpu and Citycon. In general, it can be concluded that the negative spreads are both more extreme and more common than positive spreads.

Another way of looking at the potential mispricing is to compare the prices of existing stock and the combination of a right to buy one new share and its exercise price. Figure five illustrates how the cumulative returns of these two develop through the seven days following the rights becoming transferable in the open market. Day zero denotes the closing price of each stock one day prior to the period of transferability beginning, and the return are cumulative average returns for the full sample. It is good to note that these returns are raw, as the point here is not to make judgements about the abnormal

Table 5 Extent of rights mispricing, Nasdaq Helsinki 2005–2019

Year	Issuer	Market price	Theoretical price	Mispricing
2005	Pohjola Bank	2.3825	2.4017	-0.80 %
2006	Citycon	0.2125	0.2185	-2.78 %
2006	Sanoma	2.0386	2.0230	0.77 %
2006	Tiimari	0.1900	0.1820	4.30 %
2007	Sponda	1.2288	1.2435	-1.19 %
2007	Aspocomp	0.0629	0.0750	-17.66 %
2007	Citycon	0.1433	0.1407	1.84 %
2007	Finnair	0.8986	0.9105	-1.32 %
2008	Technopolis	0.3300	0.3330	-0.90 %
2008	Terveystalo	0.0100	-0.0040	NM
2009	Nordea Bank	0.0950	0.1088	-13.59 %
2009	Pohjola Bank	1.2100	1.2457	-2.91 %
2009	Sponda	1.1789	1.2017	-1.91 %
2009	Finnlines	0.0200	0.0663	-119.90 %
2009	Stockmann	0.3340	0.3384	-1.31 %
2009	Ilkka-Yhtymä	1.6530	1.8743	-12.56 %
2009	Amer Sports	1.6117	1.6133	-0.10 %
2009	Kemira	0.9733	0.9647	0.89 %
2009	HKScan	0.8957	0.8866	1.02 %
2010	Ixonos	0.4583	0.4933	-7.36 %
2010	Suominen	0.2917	0.3550	-19.65 %
2011	Oral Hammaslääkärit	0.5813	0.6075	-4.42 %
2011	Cencorp	0.0024	0.0016	41.87 %
2011	Cramo	2.1170	2.1170	0.00 %
2011	Aspo	0.3433	0.3710	-7.74 %
2011	Bank of Åland	0.2639	0.5332	-70.33 %
2012	Outokumpu	3.9854	4.7355	-17.24 %
2012	Technopolis	0.1078	0.1039	3.65 %
2012	Tecnotree	0.0027	0.0061	-82.30 %
2012	Citycon	0.0898	0.0853	5.11 %
2013	Citycon	0.1916	0.2357	-20.70 %
2013	Talvivaara	0.3263	0.6750	-72.69 %
2013	Finnlines	0.0030	-0.0122	NM
2013	Technopolis	0.3688	0.3684	0.11 %
2014	Cencorp	0.0119	0.0357	-110.14 %
2014	Outokumpu	0.2434	0.2789	-13.60 %
2014	Citycon	0.0067	0.0088	-27.87 %
2014	Lemminkäinen	0.6488	0.6389	1.54 %
2015	Oriola	0.2161	0.2154	0.31 %
2015	Metsä Board	0.1797	0.1853	-3.07 %
2015	Citycon	0.1289	0.1271	1.35 %
2015	SRV	0.2567	0.2924	-13.00 %
2015	Ixonos	0.0017	0.0007	85.28 %
2016	Sponda	0.0010	-0.0080	NM
2016	Etteplan	0.1399	0.1510	-7.64 %
2016	Technopolis	0.4345	0.4321	0.53 %
2017	Qt Group	0.2075	0.2129	-2.53 %
2017	Digia	0.0832	0.1069	-25.14 %
2018	Ahlström-Munksjö	0.7651	0.7680	-0.38 %
2019	Glaston	0.2697	0.3333	-21.18 %

returns, which was done previously. Rather, the point is to simply examine the relationship between two alternative prices for purchasing the same asset.

It can be seen that the option for buying the stock via rights is on average cheaper throughout the period in question. The spread remains fairly stable and both methods experience quite a large negative return, particularly during the first few days of rights transferability. This is well in line with the observation made previously about the large negative abnormal returns a few days after the ERD, as rights becoming transferable often takes place around then.

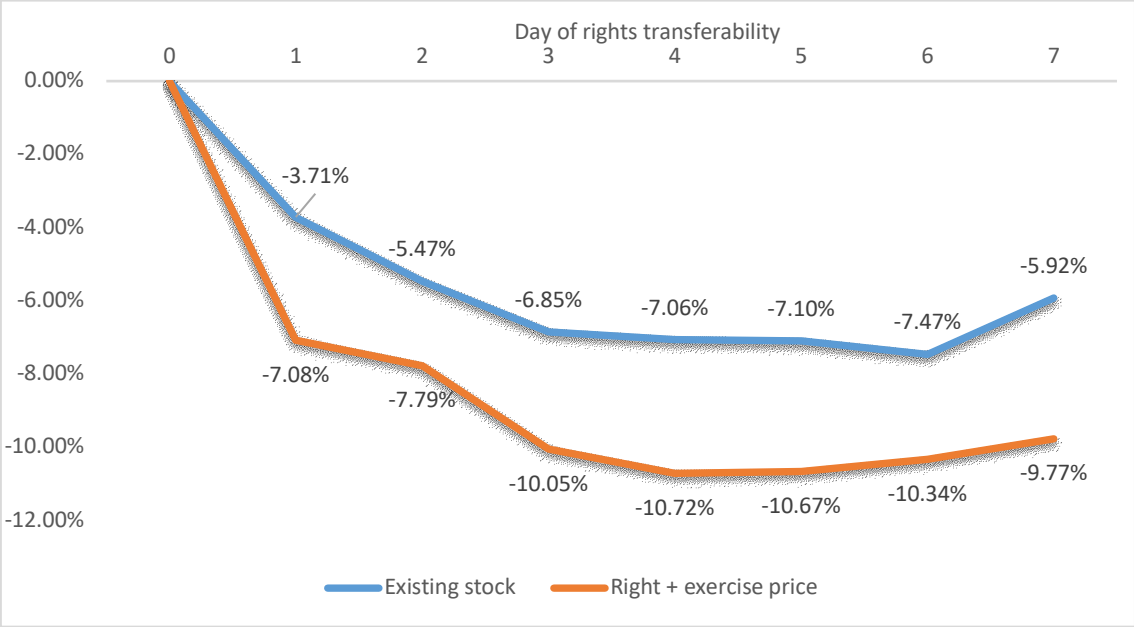
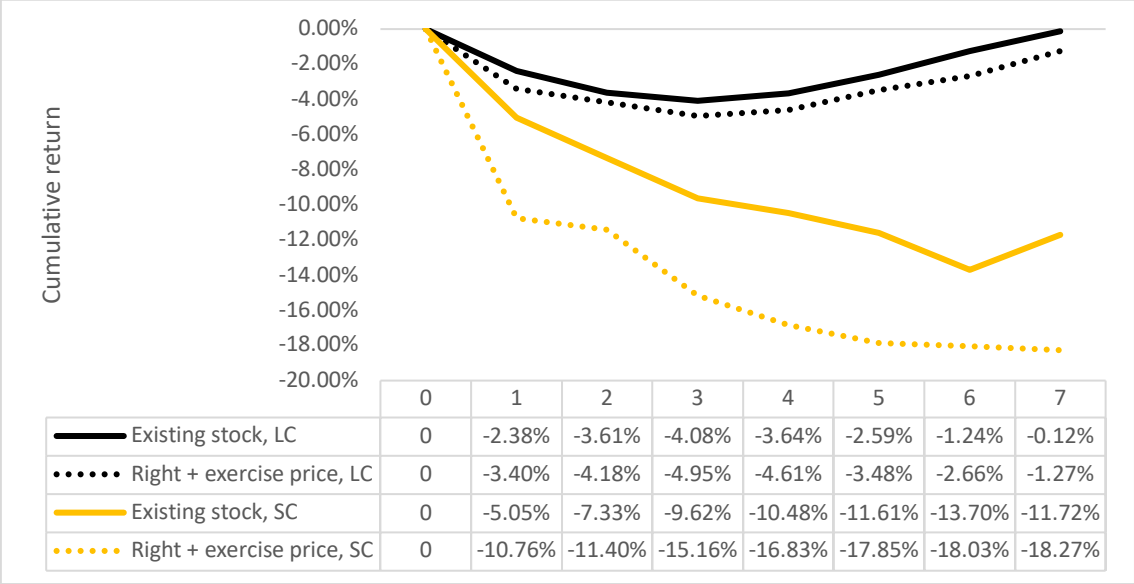


Figure 5 Cumulative returns during rights transferability

In order to get a view on the differences between small and large cap stocks, the same grouping described before in abnormal returns examination is used. Figure six below illustrates these findings. The abbreviations LC and SC refer to large cap and small cap, respectively.

The common things for both subsamples are that the cumulative returns are negative throughout the seven-day period and that the combination of a right and its exercise price on average trades lower than the existing stock. The differences lie in the fact that the moves in small cap stocks are more extreme, resulting in quite large negative returns that do not really recover by the seventh day. In contrast, the subsample of large cap stocks somewhat recovers as time passes by.



	0	1	2	3	4	5	6	7
Existing stock, LC	0	-2.38%	-3.61%	-4.08%	-3.64%	-2.59%	-1.24%	-0.12%
Right + exercise price, LC	0	-3.40%	-4.18%	-4.95%	-4.61%	-3.48%	-2.66%	-1.27%
Existing stock, SC	0	-5.05%	-7.33%	-9.62%	-10.48%	-11.61%	-13.70%	-11.72%
Right + exercise price, SC	0	-10.76%	-11.40%	-15.16%	-16.83%	-17.85%	-18.03%	-18.27%

Figure 6 Cumulative returns of large cap and small cap subsamples

What are the implications of these findings for investors? Well, first of all during the period of rights transferability it is on average cheaper to get the stock of a company by buying the right and exercising it than to just buy the stock outright. This is not the case for all rights offerings though, as on some occasions the rights trade at a premium relative to their theoretical or implied value. But on average it is, within both groups, large cap and small cap stocks.

Similar to what was discussed about the potential ways for investors to try and benefit from abnormal returns around the ERD, the ways for benefitting from rights mispricing

are somewhat complicated. Although in theory selling the more expensive stock short and covering the position by buying the cheaper alternative sounds easy, the quite limited number of shortable stocks in Finland makes it difficult to deploy in practice. Especially among the smaller cap stocks where rights mispricing is found to be more extreme, the odds of an investor being able to sell short any of the stocks is negligible. However, one situation where the information obtained could prove useful is if the investor already holds the stock once the period of rights transferability begins. By simultaneously selling the previous ownership, buying rights trading below their theoretical value and exercising them, the investor could be left with the same ownership and some extra cash or a larger ownership with the same price paid, given the assumption of no trading costs or tax ramifications.

7 Conclusions and ideas for future research

The primary focus of this thesis has been to examine the ERD effect on the Finnish stock market, and a secondary focus the rights mispricing during the period of rights transferability. It has been shown that the hypotheses laid out in the beginning of this thesis can all be accepted: The average abnormal return on the ERD is positive and significant, and the cumulative average abnormal return after the ERD is negative and significant. In addition, rights on average, and in most cases, trade below their theoretical or implied value. Furthermore, tests run to study the differences between groups of large cap and small cap stocks show that both the ERD effects and rights mispricing are generally more extreme among small cap stocks but exist also for the large cap stocks. This is understandable per se, since the small cap stocks in Finland and in this study often trade with quite low liquidity, and due to that and market cap constraints, they are often inaccessible for large institutional investors.

The findings provide market participants information about the typical nature of stock returns around rights offerings, which are a method of equity financing. The currently ongoing COVID-19 pandemic has unexpectedly shaken many companies, even entire industries, and it continues to do so. If the exceptional times become even more prolonged, it is likely that more and more companies will need to seek financing, which might make rights offerings more common once again. This happened in the Finnish stock market during and after the global financial crisis as well.

It was discussed that due to factors, such as some stocks not being shortable, there are limits to how well investors can try and exploit the market inefficiencies and even the theoretical chances for arbitrage that were found. But this does not mean that the results are in any way useless. Especially for longer-term investors the findings concerning the abnormal large negative post ERD returns, and negative mispricing of subscription rights may offer ideas on how to take advantage of these special situations. For example, even if the investment horizon in general is longer, it is useful to consider whether sitting through an abnormal negative 9% drawdown within days of the ERD makes sense or not.

Regarding ideas for future research, some potential topics come to mind. First of all, with more advanced access to information about which stocks have been shortable at a given period of time, better conclusions about the returns of different investing strategies around the ERD could be made. In addition, by using substantially longer event periods, conclusions about the longer-term abnormal returns could be computed. By doing so, it would also be possible to examine what kind of implications carrying out a rights offering has for the financial performance of the companies.

As the COVID-19 pandemic hopefully gets under control eventually and the business environment normalizes, research could be conducted about the differences of rights offerings and stock returns around them during different periods of crises, or by comparing the results during economic downturns and booms. In addition, it would be interesting to find out whether the stock market responds to rights offering announcements differently depending on whether the reason for carrying it out is just to strengthen the company balance sheet or to finance growth investments.

Another interesting viewpoint would be to compare the rights mispricing and ERD effect between different countries through time, as most studies conducted only focus on one country and market. Now the comparison has to be made by going through several separate studies which is somewhat problematic, as the methodologies used are often a bit different, affecting the comparability of the results obtained. But it is also good to keep in mind that the way rights offerings are carried out may differ from one country to another, thus making it more difficult to make direct comparisons.

Overall, the fact that rights offerings are fairly common mainly in Europe, Asia and Australia, it is understandable that the topic has not been that exhausted recently. However, as terrible and tragic as the COVID-19 pandemic has been, it has brought up this topic, as many companies and industries are suddenly in need of capital to strengthen their financial positions. Room for further research remains, and the possibilities that this new crisis time data will bring with it should offer researchers some food for thought.

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Appendices

Appendix 1. Observations included in the large cap subsample

Company	ERD	Market capitalization at the time of announcing the offering, MEUR
Nordea Bank	13.3.2009	12053
Sanoma	4.4.2006	3278
Metsä Board	27.2.2015	1926
Pohjola Bank	17.10.2005	1632
Ahlström-Munksjö	20.11.2018	1561
Pohjola Bank	31.3.2009	1555
Citycon	16.6.2015	1524
Citycon	10.6.2014	1284
Kemira	24.11.2009	1188
Stockmann	17.8.2009	1126
Sponda	1.3.2016	1062
Sponda	10.1.2007	981
Outokumpu	8.3.2012	955
Outokumpu	3.3.2014	889
Citycon	14.2.2013	798
Finnair	22.11.2007	797
Citycon	11.9.2007	742
Citycon	10.9.2012	658
Cramo	25.3.2011	643
Oriola	11.2.2015	573
Citycon	27.3.2006	533
Amer Sports	25.9.2009	472
Technopolis	5.11.2013	427
Technopolis	1.9.2016	417
Sponda	26.5.2009	372

Appendix 2. Observations included in the small cap subsample

Company	ERD	Market capitalization at the time of announcing the offering, MEUR
HKScan	25.11.2009	370
Finnlines	8.5.2013	328
Talvivaara	11.3.2013	294
Lemminkäinen	25.8.2014	265
Finnlines	27.5.2009	264
Technopolis	29.4.2008	243
Aspo	6.4.2011	242
Technopolis	16.5.2012	235
Ilkka-Yhtymä	31.8.2009	167
Bank of Åland	14.9.2011	151
Qt Group	15.3.2017	145
SRV	19.8.2015	136
Etteplan	10.5.2016	102
Terveystalo	16.9.2008	93
Glaston	31.5.2019	78
Digia	1.6.2017	56
Cencorp	21.2.2011	50
Oral Hammaslääkärit	18.1.2011	35
Suominen	2.6.2010	33
Tiimari	29.11.2006	33
Aspocomp	19.3.2007	32
Ixonos	2.6.2010	28
Tecnotree	29.5.2012	22
Cencorp	10.12.2013	21
Ixonos	3.12.2015	16